

### REMARKS

The applicants thank the Examiner for his careful attention to this matter. Claims 1-32 are pending in the application, and claims 1-32 have been rejected.

#### Objections

The Examiner has objected to claims 1 and 4 due to informalities. The applicants have amended these claims in the manner suggested by the Examiner. Although not objected to, the applicants have also amended claim 30 to provide antecedent basis for the term "element."

#### Rejections under 35 U.S.C. § 103 over Hatanaka

The Examiner rejected claims 1-3, 6-14, 16-21, 23, 24, 26 and 27 under 35 U.S.C. § 103(a) as being unpatentable over Hatanaka (U.S. Patent No. 5,923,573). Claims 1, 14, and 18 are the independent claims of this group. Claim 1 recites a method of propagating changes made to a design model. The method comprises identifying a change to a first element, creating a first step based on the element's structure or a relationship between the element and another element or elements, creating a second step based on the first step and one of the elements' structure or a relationship between two of the elements, and executing the steps. Hatanaka discusses a CAD system used with "kit models," which are pre-made three-dimensional wire frame models formed by a group of lines. *See* Hatanaka, Col. 5, lines 28-32. These kit models appear to be generic models to which a designer can add details or make changes. Each of the wire frame lines intersects other lines. *Id.* A designer can input "modification information" to modify details of the wire frame lines (including "characteristic lines," which are lines the designer adds to the model). A modification routine 16 then changes individual characteristic lines. *See id.*, Col. 6, line 58 to Col. 7, line 6. The patent indicates that a "model regeneration function" will cause elements that are related to an object element to be changed when the object element is changed. *See id.*, Col 7, lines 18-19, 28-32, 43-45. The patent also discusses a particular manner in which relationships among elements can be tracked using "generation relationship data." *See id.*, Col. 7, line 56 to Col. 8, line 67. To regenerate a modified model, modification information

is received from an operator, and elements associated with the modified elements are determined using the relationship data. *Id.*, Col 9, lines 12-25. Items known as “F nodes” for each element that are affected by a change are put into an “F node queue” 161a, and “generation functions” relating to F Nodes of particular elements are executed until the queue is empty, and the regeneration is complete. *Id.*, Col. 9, lines 26-56; Col. 9, line 57 to Col. 10, line 54 (describing generation functions). Thus, the system identifies elements to be updated, checks the F nodes for those elements into an F node queue, and executes generation functions for each element.

The Office Action equates the generation relationship data of Hatanaka with the “first step” creation of the pending claims. *See* Office Action, at 4. However, the generation relationship data of Hatanaka is merely information regarding the correlation between one graphic element and other graphic elements (such as “ingredient elements”). As Hatanaka notes: “[T]he generation relationship data 24 retains information as to with which and how the geometric shapes of the graphic elements are generated.” Hatanaka, Col. 8, lines 3-5. In contrast, pending claim 1 recites “creating a first step based on the structure of the first element or on a relationship between the first element and another element or elements.” Thus, claim 1 recites the action of doing something with certain information regarding element relationships, i.e., creating a first step with it. The examiner merely points to the presence of relationship information in Hatanaka, not the use of it, and particularly not the use of the information in the manner that information is used in pending claim 1. The mere fact that the system of Hatanaka causes other elements to be changed when one element is changed does not mean that Hatanaka accomplishes the change in the manner recited in claim 1.

Hatanaka also fails to disclose or suggest Claim 1’s recitation regarding a second step. The Office Action recognizes that Hatanaka does not disclose or suggest the use of a second step, but opines, without evidentiary support, that such a modification would have been obvious. First, this rejection is incorrect because it lacks any evidentiary support. Second, pending claim 1 does not simply recite the creation of a second step; it recites creating a second step based on the first step and the structure of one of the elements or on a relationship between two of the elements, so that the second step is dependent on the first. The claim also recites the creation of the steps together, followed by the execution of each respective step after it has been created. Neither of these features is disclosed or even suggested in Hatanaka, or in any other reference

identified in the Office Action. Therefore, for the reasons stated above, the applicants respectfully suggest that claim 1 is in condition for allowance.

Claim 18 also recites a method involving the generation of a first step and a second step to carry out changes made to an element. The second step is based on a predefined relationship between the first element and one or more other elements, or on changes in a predefined relationship between the first element and one or more other elements. As with claim 1, claim 18 recites steps that have certain dependencies and create certain results. The Office Action does not indicate that the "generation relationship data" of Hatanaka meets these requirements, or even suggests them, as indicated in the preceding paragraphs.

The claims that depend on claims 1 and 18 are allowable because claims 1 and 18 are allowable, and are also further differentiated from Hatanaka. As an initial matter, the dependent claims, like the independent claims, have generally been rejected even though the Office Action admits that Hatanaka does not disclose all that is recited in the claims. Instead, a conclusion is generally made, without supporting authority or evidence, that particular modifications would have been obvious. This is an improper and insufficient analysis, and applicants submit that each of the claims has been improperly rejected for this reason alone. *See In re Lee*, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002) (noting that Board must provide explicit factual support for its conclusions supporting rejections). Notably, such modifications were not obvious to Hatanaka, who did not disclose them in his patent, and nothing in the Hatanaka patent even suggests such combinations or modifications.

There are also multiple bases, apart from the patentability of claims 1 and 18, for the allowability of the dependent claims. For example, claim 6 recites that the steps are stored in a step repository. To meet this feature, the Office Action merely indicates that Hatanaka discloses that relationship data can be stored in an element's data structure. But as indicated above, this relationship data is not steps. Furthermore, the element's data structure is not a step repository. The step repository comprises areas where steps—the features that are executed to implement changes to a model—are stored. *See Application*, page 8, lines 18-20. Thus, Hatanaka does not disclose or suggest the storing of steps in a step repository. As another example, claim 7 recites that one of the steps is a nul step, and claim 8 recites that the nul step instigates regeneration. The Office Action admits that Hatanaka does not disclose this feature. Also, the Office Action

does not provide any evidentiary support for the proposition that the use of a nul step is “commonly found.” More important, even the statement in the Office Action does not show that such a step is commonly used *with a design model*, and more particularly that a nul step is used as one of the steps that are executed to change elements in a design model. The reference in the Office Action to use of nul items with dialogue boxes would actually seem to indicate otherwise. Also, the comparison of “undo” to the instigation of regeneration by a nul step is also inapposite, as the nul step is a special form of a step that would be performed to reflect changes to a model, not simply a command from a user, such as “undo,” which is not even a nul command, let alone a nul step. Finally, the grafting of a nul step onto Hatanaka in the Office Action appears to be motivated solely by the teaching of the pending application, and not by any motivation in the prior art to provide the feature. As a result, the Office Action involves an improper hindsight analysis. *See, e.g., In re Kotzab*, 217 F.3d 1365, 55 USPQ2d 1313 (Fed. Cir. 2000) (faulting the Examiner and Board for falling into the “hindsight trap.”); *Al-Site Corp. v. VSI Int’l, Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999). For each of these reasons, claim 7 and 8 are also in condition for allowance.

As another example, claims 9 and 17 recite the provision of an atom associated with the element. The atom marks changes made to the first element and expresses a dependency between one or more steps (claim 9), or links the model element to the first step (claim 17). The Office Action equates Hatanaka’s geometric shape data with the recited atom. While the geometric shape data of Hatanaka may consist of atoms, the Office Action does not indicate that it marks changes to an element, expresses a dependency between steps, or links an element to a step. The applicants also do not see where Hatanaka discloses or even suggests such functionality for an atom. As a result, claims 9 and 17 are also patentable for this additional reason. Regarding claim 10, which recites that the second step depends on a relationship between the first element and a class of elements, Hatanaka does not even disclose a second step, as the Office Action admits. Moreover, although Hatanaka may modify certain elements in response to changes made to a first element, that does not mean that Hatanaka makes those modifications as recited in claim 10. Thus, the applicants submit that claim 10 is allowable for this reason also.

As another example, claim 11 recites the execution of geometry steps that are associated with the first step or the second step. As the pending application indicates, the geometry steps are separate from the regular steps that are executed to update a model, so that, for example, a complicated geometry can be updated using such geometry steps. *See Application*, page 11, lines 1-12. The use of F nodes associated with geometric relationship data in Hatanaka does not disclose or suggest such features. In particular, as the examiner appears to recognize, the F node is an item that stores information about relationships (*see Hatanaka*, Col. 8, lines 13-27), such as geometric relationship data. This is not a step—it is simply the data that reflects relationships, as discussed above for claim 1. And nothing in Hatanaka discloses or suggests that special steps apart from the regular steps that are executed, could be used to modify certain geometries, such as complicated geometries.

As yet another example of the added allowability of the dependent claims, claims 12 and 24 recite locked steps which are not executed or whose execution is limited. Hatanaka merely provides a flag to indicate that certain relationship data is locked; it does not disclose or even suggest the use of a locked step. Again, this rejection conflates the data for the model with the steps that are executed to modify the model. Hatanaka's flag is not a locked step and does not suggest the use of such a step. As to claim 13, which requires the generation of an error signal if the first or second step cannot be sorted, the Office Action cites no evidence for the proposition that such a feature would have been obvious. Therefore, the applicants submit that no *prima facie* case for a rejection has been made, and request prompt allowance of claim 13 for this reason also. Claim 20 (which depends on claim 18) recites that the second step is one of a plurality of steps that can effect changes to the same element, and the second step is selected from the plurality of steps based on the first step. Again, the Office Action admits that Hatanaka lacks such a teaching, and provides only a conclusion regarding obviousness. Claim 21 depends on claim 20 and recites that the second step is selected from the plurality of steps based on the generation of other steps. Again, Hatanaka does not disclose or suggest a second step or its use as recited in claim 21, and there is no support for the Office Action's conclusion that use of a step in the manner recited in claim 21 is a standard function in a CAD system. Claim 23, like claim 7, recites a nul step; for the reasons discussed above, Hatanaka does not disclose or suggest such a feature. The remaining rejections of dependent claims also rely on conclusions that

certain features would have been obvious, but without any factual support. Therefore, the applicants submit that each claim is in condition for immediate allowance.

Hatanaka also does not render obvious claim 14, the independent system claim. Claim 14 recites a system for regenerating a design model comprising a model element, a step propagator that receives a first step that represents changes in the model element and produces a second step that represents other changes in the model element that are dependent on the first step, and a step executor that executes the first step and the second step. As noted above, Hatanaka appears merely to place F nodes in a queue, and to perform generation functions on each node sequentially until the queue is empty. Thus, Hatanaka does not disclose or even suggest the creation of two separate steps that can be executed to regenerate a design model, where the second step represents changes that are dependent on the first step. The Office Action again recognizes the shortcomings of Hatanaka, and provides no evidence to support a conclusion of obviousness. As a result, the applicants respectfully suggest that claim 14 is in condition for immediate allowance, and request the same. Dependent claim 16 is additionally patentable because Hatanaka does not disclose or suggest an element table that stores the model element.

Rejections under 35 U.S.C. § 103 over Hatanaka in view of Ardoin et al.

The Examiner rejected claims 4, 5, 15, 22, 28, 30 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Hatanaka (U.S. Patent No. 5,923,573) in view of Ardoin et al. (U.S. Patent No. 5,692,184). Claims 30 and 32 are the independent claims of this group.

In general, the added features of the dependent claims relate to sorting of the steps that are executed to reflect changes in a model. Amended claim 4 adds to claim 1 the recitation of "sorting at least some of the steps before executing the steps," while claim 5 adds to claim 4 the feature wherein the "sorting is conducted using a depth-first search sorting method." Claim 15 adds to claim 14 "a step sorter that sorts the first step and the second step according to dependencies between steps." Claim 22 adds to claim 18 the feature of "sorting the first step and the plurality of steps to ensure that each step is executed after steps on which it depends are executed," while claim 28 adds to claim 18 the feature wherein "the first plurality of steps depends on the execution of the first step."

As an initial matter, Ardoin does not disclose any of the subject matter that is missing from Hatanaka as discussed above, so the applicants respectfully suggest that the rejection of the dependent claims (4, 5, 15, 22, and 28) should be withdrawn for this reason. In addition, Ardoin simply discusses the ordering of "nodes," which are items that "can represent a value, an associative evaluation function or a predicate." Ardoin, Col. 6, lines 34-37. Ardoin does not indicate that these nodes are steps as identified in the pending application and recited in the pending claims. In addition, Ardoin indicates that the nodes are ordered so that they can be re-evaluated, thus indicating that they were *not* sorted when an initial execution was performed. Thus, for these reasons, even if one assumed that Hatanaka disclosed all of the other elements of the claims, Ardoin does not disclose or suggest the sorting of steps. Moreover, as to claim 5, the Office Action simply asserts that Ardoin discloses something that is "equivalent in functionality" to the claimed depth-first searching. Even if that were true, such a test is not the test for obviousness. Rather, the test is whether the claimed invention as a whole would have been obvious to an artisan of ordinary skill. To meet such a requirement, one must generally show that the prior art references disclose or suggest all that is recited in the claim, and that there is a motivation to combine the references in the manner claimed. The applicants submit that the Office Action has not made such a showing, that there is, therefore, no prima facie showing of obviousness, and that the claims are in condition for allowance.

Independent claim 30 recites a method for updating data in a computer model, comprising analyzing an element to determine if it has been touched by a change, associating the element with one or more steps that effect the change, creating one or more additional steps that propagate changes based on relationships between the element and other elements, sorting the one or more steps and the additional steps to eliminate interference among the steps, and executing the sorted steps. Again, no reference discloses or suggests the use of multiple steps as recited in the claim. Also, as noted in the preceding paragraph, Ardoin does not disclose or suggest the sorting of steps to eliminate interference among steps.

Independent claim 32 recites a method for propagating a change, comprising identifying an atom associated with a changed element, generating a first step to carry out the change, retrieving relationship information that defines predetermined relationships among elements, generating propagated steps that depend on the change and the relationship information, sorting

the steps; and executing the steps to properly reflect the changes to the element and the related elements. Again, as described above, neither of the cited references disclose or suggest the generation of propagated steps that depend on a first step, and neither reference discloses or suggests the sorting of such steps. As a result, claim 32 is also in condition for allowance.

Rejections under 35 U.S.C. § 103 over Hatanaka in view of Pabon

The Examiner rejected claim 29 under 35 U.S.C. § 103(a) as being unpatentable over Hatanaka (U.S. Patent No. 5,923,573) in view of Pabon (U.S. Patent No. 5,251,290). Claim 29 depends on independent claim 18, and adds the feature of “verifying the elements after execution for constraint satisfaction.” As an initial matter, Pabon does not disclose or suggest any of the matter that is missing from Hatanaka as discussed above for claim 18, so claim 29 is patentable for this reason. In addition, Pabon produces an ordered dependency list that is used as an execution sequence. *See* Pabon, Abstract; Col. 2, lines 61-65. Thus, even if Pabon is assumed to impose restraints, it does so before execution, not after. Thus, Pabon does not disclose or suggest the verification of elements after execution for constraint satisfaction, as recited in claim 29. And again, the Office Action has not presented any motivation (outside of the applicants’ disclosure) to combine the prior art as the examiner has done here. For these reasons, the applicants submit that claim 29 is in condition for immediate allowance, and request the same.

Rejections under 35 U.S.C. § 103 over Hatanaka in view of Hollingsworth

The Examiner rejected claim 25 under 35 U.S.C. § 103(a) as being unpatentable over Hatanaka (U.S. Patent No. 5,923,573) in view of Hollingsworth et al. (U.S. Patent No. 5,444,836). Claim 25 depends on independent claim 18, and adds the feature wherein “the plurality of steps is generated by prediction.” Hollingsworth simply discusses using rules to place graphical objects (such as inserted blocks from libraries) into a model. Hollingsworth does not appear to relate to the execution of steps to reflect changes that have been made in a drawing. Also, Hollingsworth merely discusses the use of rules for the placement of the objects. But these rules do not constitute or even suggest the generation of a plurality of steps by prediction. Rather, the rules simply define things like the nominal position and angle of an object when it is inserted, *see* Hollingsworth, Col. 6, lines 9-10, or offset information relative to other objects, *id.*,



lines 15-17. Thus, applicants respectfully suggest that Hollingsworth fails to fill the gaps in Hatanaka, and that claim 25 is, therefore, in condition for immediate allowance.

Rejections under 35 U.S.C. § 103 over Hatanaka in view of Hollingsworth and Pabon

The Examiner rejected claim 31 under 35 U.S.C. § 103(a) as being unpatentable over Hatanaka (U.S. Patent No. 5,923,573) in view of Hollingsworth et al. (U.S. Patent No. 5,444,836) and Pabon. Claim 31 is an independent claim.

Claim 31 recites a method of propagating changes made in one data element to a related data element, comprising accumulating changes made to the one data element, identifying a predetermined number of possible mutually-exclusive sets of changes that may be made to a related data element, selecting the most appropriate set of changes by employing a predetermined selection standard, and testing the selected set of changes to determine whether it is an appropriate set of changes. The examiner appears to rely on Hollingsworth (and perhaps on unstated knowledge of the skilled artisan) as disclosing the steps of identifying sets of changes, and selecting the most appropriate set of changes. However, as noted above, Hollingsworth simply discloses a system that uses certain rules for the placement of objects. If a particular rule causes "overplotting," the rule fails. *See* Hollingsworth, Col. 10, lines 24-30. This disclosure by Hollingsworth does not, as the Office Action maintains, indicate that any sort of selection of one set of changes is being made from among a group of possible changes. Rather, it merely shows the failure of a rule. Nor does Hollingsworth make any other such suggestion to the applicants' knowledge. Therefore, the applicants suggest that claim 31, like the other claims, is in condition for immediate allowance.